

WHAT IS CLAIMED IS:

1. A laser shock peening apparatus comprising:
 - a laser unit for generating at least one laser beam aimed at a laser shock peening area,
 - 5 an anti-feedback means for preventing electromagnetic radiation reflections from the target area from entering the laser unit during laser shock peening, and
 - 10 the anti-feedback means located between the laser unit and a final focusing lens.
2. An apparatus as claimed in claim 1 wherein the anti-feedback means includes an optical isolator at an output of the laser unit.
- 15 3. An apparatus as claimed in claim 2 wherein the optical isolator is a faraday isolator.
4. An apparatus as claimed in claim 3 wherein the faraday isolator includes an entrance polarizer, a faraday rotator, and an exit polarizer.
- 20 5. An apparatus as claimed in claim 4 wherein the faraday rotator includes a high verdet constant material positioned in an axial magnetic field.
6. An apparatus as claimed in claim 2 wherein the optical isolator is at least one thin film polarizer.
- 25 7. An apparatus as claimed in claim 2 wherein the optical isolator is at least one glan prism polarizer.
8. An apparatus as claimed in claim 2 wherein the

optical isolator is at least one circular polarizer.

9. An apparatus as claimed in claim 2 wherein the optical isolator is at least one independent pig tailed optical isolator.

5 10. An apparatus as claimed in claim 2 wherein the optical isolator is at least one independent pig tailed optical isolator.

10 11. An apparatus as claimed in claim 2 wherein the optical isolator is at least one mirror with an enhanced P polarization coating.

12. An apparatus as claimed in claim 2 wherein the optical isolator is at least one mirror with an enhanced S polarization coating.

15 13. An apparatus as claimed in claim 1 wherein the laser unit includes an oscillator and a final amplifier, and an output of the laser unit located after the final amplifier.

20 14. An apparatus as claimed in claim 13 wherein the anti-feedback means includes an optical isolator at the output of the laser unit.

15. An apparatus as claimed in claim 14 wherein the optical isolator is a faraday isolator.

25 16. An apparatus as claimed in claim 15 wherein the faraday isolator includes an entrance polarizer, a faraday rotator, and an exit polarizer.

17. An apparatus as claimed in claim 16 wherein the faraday rotator includes a high verdet constant material positioned in an axial magnetic field.

18. An apparatus as claimed in claim 2 further comprising:

5 a laser beam centerline of the laser unit located in a first plane,

a second plane passing through the target area parallel to, and offset from the first plane,

10 beam bending optics located after the anti-feedback means, and

the beam bending optics being effective for bending the laser beam centerline from the first plane to pass through the second plane.

15 19. An apparatus as claimed in claim 18 further comprising the beam bending optics being effective for bending the laser beam centerline at an acute angle A more than 3 degrees from the first plane.